



Handbuch

Manual

Manuel

MASI20



AS-i

Instruction Manual for Devices of the

MASI20 series

Art.-No. 55 685	MASI20 DI4 DO4R
Art.-No. 55 686	MASI20 DI4 DO4
Art.-No. 55 687	MASI20 DI4 DO3 AB
Art.-No. 55 688	MASI20 DI4 AB
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Version 1.0

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Additions / corrections to the manual

Version	Chapter	Additions / corrections	Date/Name
0.1		Issued by	15.06.04 / ERW
0.2		MASI40 => MASI20	27.07.04 / ERW
1.0		Correction	11.08.04 / DK

Notes :

Concerning this manual :

The text, illustrations, diagrams and examples used in this manual serve solely for the purpose of explanation, operation and application of Input/Output modules of the MASI20 range.

If you should have any further reaching questions regarding the installation and set-up of the equipment described in this manual, please don't hesitate to contact us. We would be glad to assist you any time.

info@murrelektronik.fr

Murrelektronik reserves the right to make technical changes or modifications to the devices and to this manual without prior notice.

Chapter overview :

The "Safety Information" section must be read without fail **prior** to working with the products and the system. This section contains information required for safe installation and handling.

The "Configuration Information" section directs itself to system planners. It offers important information and details relevant to successful configuration.

The "Installation" section provides details regarding installation, in both mechanical and electrical context. This chapter addresses itself in particular to qualified and trained electricians responsible for the assembly and installation of system components.

The "Setup" and "Diagnosis" sections are intended for the setup personnel. They offer important notes and information with regard to the rapid and uncomplicated setup of modular modules and of the whole system.

1 Safety information

1.1 Designated use

The input and output modules of the MASI20 series are designated for use only in those areas as described in this manual.

Strict adherence to the data specified in this manual must be ensured. The products have been developed, manufactured, tested and documented in compliance with current safety codes.

The equipment poses no danger to operating personnel or material if configuration, assembly and operation are performed in compliance with the stated handling and safety regulations.

Unqualified intervention in the hardware and software of our equipment, disregard of warning labels found on the equipment or non-observance of the information in this product manual can result in injury or serious damage to man and/or material.

Only supplementary or extension devices that have been recommended by Murrelektronik may be employed in conjunction with products of the MASI20 series.

Any application or usage beyond and above this shall be regarded as non-designated.

1.2 Target groups

This manual addresses itself exclusively to qualified and trained electricians knowledgeable in the safety standards of automation technology.

Only a qualified, trained electrical tradesman knowledgeable in the safety standards of automation technology may perform configuration, installation, set-up, maintenance and testing of the equipment.

Only Murrelektronik technical personnel are allowed to undertake intervention in the hardware and software of our equipment, inasmuch as this is not described in this manual.

1.3 Regulations

Current safety and accident prevention laws valid for a specific application must be observed in the configuration, installation, setup, maintenance and testing of the equipment.

1.3.1 EC directives



This equipment fulfils the requirements of EC directive 89/336/EWG „Electromagnetic compatibility“.

There are no restrictions to applications in residential, business and industrial areas, including industrial facilities large and small.

1.3.2 Electrical safety

All devices connected to this equipment must fulfil PELV directives (Protected Extra Low Voltage) according to HD 384.4.41.

1.3.3 General information

- a) The designated function of this equipment is guaranteed only if the conditions for installation, system extension, operation and maintenance are complied with.
- b) Only system extensions and cables are allowed which meet the requirements and regulations for safety, electromagnetic compatibility and, where applicable, telecommunications transmission equipment and specifications.
The installation of other extensions may violate these requirements and regulations or damage the equipment.
Information concerning the type of system expansions and cables that are permitted, can be obtained either from your Murrelektronik distributor or taken from this manual.
- c) The designated operation of the equipment is guaranteed only with the housing fully installed.
- d) This product is designed and manufactured to assure protection against damage if designated usage and proper maintenance are observed.

1.4 Information regarding standards

1.4.1 Equipment standards

- EN 50295 Low voltage switching devices – Control systems and device interfaces – Actuator Sensor Interface (AS-i).
- EN 60 947-1 Low voltage switching devices
Part 1: General conventions.

1.4.2 EMC standards

- EN 50295 Low voltage switching devices – Control systems and device interfaces – Actuator Sensor interface (AS-i).
- EN 55011 Industrial, **S**cientific and **M**edical high frequency equipment – Radio interference – Limit values and sensing methods.
- EN 61000-4-2 EMC Part 4 : Testing and sensing methods
Main section 2 :
 - Test of immunity to static electrical discharge according to basic EMC standards.
- EN 61000-4-3 EMC Part 4 : Testing and sensing methods
Main section 3 :
 - Test of immunity to RF electromagnetic fields.
- EN 61000-4-4 EMC Part 4 : Testing and sensing methods
Main section 4 :
 - Test of immunity to rapid transient disturbances/burst – EMC basic standards.
- EN 61000-4-6 EMC Part 4 : Testing and sensing methods
Main section 6 :
 - Test of immunity to asymmetric RF input
 - EMC basic standard.
- AS-i Complete Specification Version 2.1, Section 8 EMC.

1.4.3 Safety standards

- EN 60 295 Low voltage switching devices – Control systems and device interfaces – Actuator Sensor interface (AS-i).
- EN 60 947-1 Low voltage switching devices
Part 1: General conventions.
- EN 60 529 Type of housing protection (IP-Code)
- VDE 0100 Part 410/HD 384.4.41 Installation of power systems and equipment with nominal voltages up to 1 000V
Part 4 : Protective measures.
 - Chapter 41 : Protection against electrocution.

1.5 Explanation of symbols

1.6 Use of attention signs

Notes containing important information are specially marked. These are illustrated as follows :



Attention text

1.6.1 Use of danger signs

Danger signs are additionally marked with an enclosing frame.



CAUTION :

Disregard of safety measures may result in damage to equipment and other serious consequences.



DANGER :

Non-compliance with the relevant safety measures poses a danger to the health and life of the user.

1.6.2 Use of numbering in illustrations

Illustrations are numbered with white numbers in black, round fields.

Example : ① Text 1.....
① Text 2.....
② Text 3.....

The explanatory text follows in tabular form under the same number, in direct context to the preceding illustration.

1.6.3 Use of handling instructions

Handling instructions describe the sequence of steps during installation, setup, operation and maintenance that must be strictly observed.

The numbering (black numerals in round white fields) is given in a sequential and ascending order.

Example : ① Instruction 1.....
② Instruction 2.....
③ Instruction 3.....

1.6.4 Use of foot notes

Supplementary information is marked with superscripted numerals (example. : Text Text ¹⁾ Text Text). These are explained in the form of footnotes beneath tables or text at the end of the page.

2 System description

2.1 AS-i system

The AS-Interface is a simple and cost-saving wiring system based on a 2-wire cable for data and power transmission to sensors over a distance of up to 100 m. System expansion > 100 m is possible with the use of repeaters.

The application area concentrates mainly on lower level industrial automation for networking simple and mostly binary sensors and actuators.

The AS-Interface is a substitute for traditional wiring between sensors, actuators and the PLC. System-based mechanisms effectively support setup, operation and maintenance.

Every AS-Interface system requires a control unit, the master. This is available as a PLC specific module, a PC card or a gateway. The application program on the control system or PC controls the decentralized I/O groups (slaves) via the master. The master performs cyclical information exchange between the master and the slaves independently. According to standard specifications, an AS-Interface network supports the operation of maximum 31 slaves. According to extended specifications, it supports the operation of maximum 62 modules.

There are two types of slaves : active and passive modules.

Active modules are slaves with interfaces linking to common binary sensors and actuators. Each data transmission cycle between the master and the slave is limited to 4 input data bits and 4 output data bits. This kind of structure and the length of the data messages support the operation of up to 124 inputs and 124 outputs (standard specifications).

The extended specification supports the operation of 248 inputs and 186 outputs.

Passive modules are typically fitted with a standard electromechanical interface (for ex. round plug connector M12) for a direct connection of sensors and actuators to the AS-Interface integrated into the field bus cable.

In order to ensure an accurate data transmission between the master and the slaves, each slave - A or B - must be assigned to a specific address configurable from 1 to 31.

Addressing can either be performed by a manual addressing device or by the master itself.

AS-Interface products are generally marked by specific logos. Such identifications allow to distinguish between certified products and such products that are AS-Interface certified by the manufacturer.



Fig. 2-1 : AS-Interface



Fig. 2-2 : Certification

Owing to the signal shape for the data transmission, it is not necessary to provide terminating resistors. Thanks to the intelligent data protocol, AS-Interface systems are extremely non-sensitive to disturbance. Consequently, you can use a non-screened bus cable.

The structure of AS-Interface systems can be compared to an ordinary electrical installation with different network topologies : line, star or tree structure.

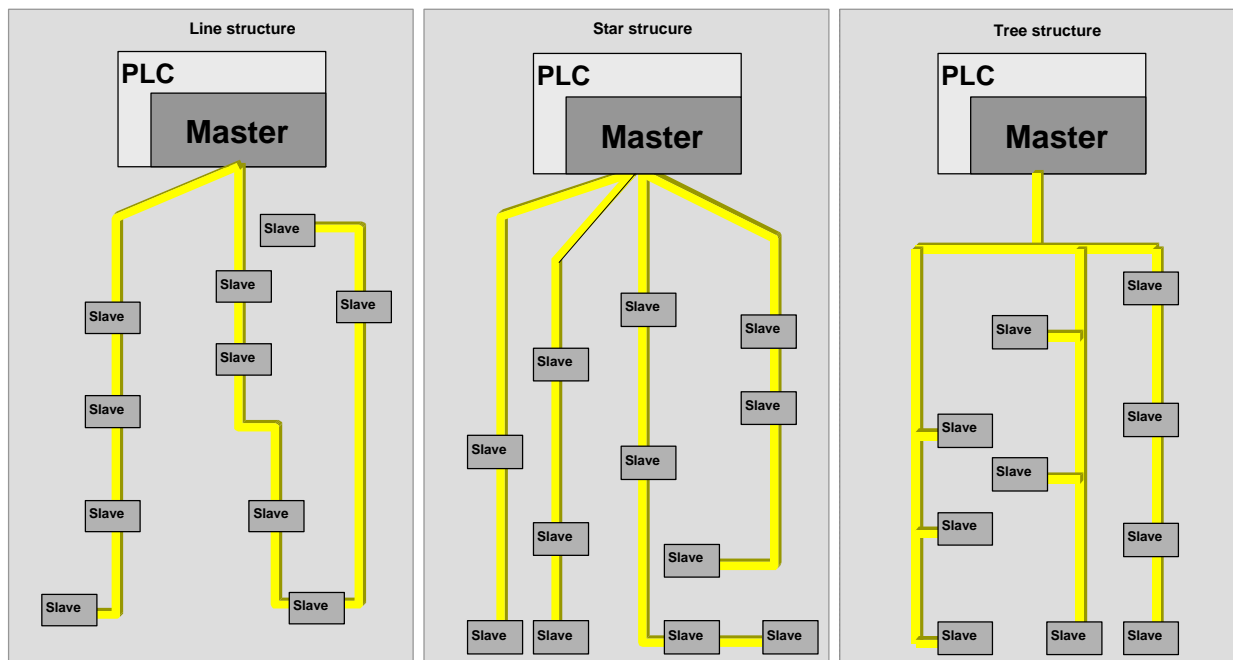


Fig. 2-3 : Topology of the AS-Interface system

The data cycle time depends on the network topology and the entire scope of the system. For a complete system with 31 slaves it is about 5 ms and with 62 slaves (extended specifications) about 10 ms.

2.2 System data

Topology	Tree structure
Transfer medium	Two-wire cable (non-screened) for data and power (up to 8A)
Cable length	Sum of all spare lines : max. 100 m
Number of slaves	Max. 31 or max. 62
Number of binary elements (according to the specification 2.0)	Up to 4 sensors and actuators per slave (max. 124 inputs and 124 outputs for a complete system)
Number of binary elements (according to the specification 2.1)	Up to 4 sensors and 3 actuators per slave (max. 248 inputs and 186 outputs for a complete system)
Addresses	A specific address for each slave between 1...31 or 1-31 A and 1-31 B (extended specification).
Addressing mode	By means of a manual addressing device or via the master.
Messages	Cyclic messages from the master to the individual slaves (master call) with instant reply from slave (slave reply).
Bit rate	4 bits of informative data per slave and message.
Data cycle time	5 ms with 31 slaves 10 ms with 62 slaves.
Error recognition	Identification of faulty messages, automatic repeat.
Master functions	<ul style="list-style-type: none"> - System initialisation - Automatic slave detection - Non-cyclical parameter transmission - Bus and slave diagnosis - Error messages to control - Automatic addressing when a slave is replaced.

Table 2.2–1 : AS-Interface system data

2.3 Information for the beginner

AS-Interface is a field bus system for industrial application whose advantages include not only its ease of handling in planning and application but also the good overview of the total system.

To make the system even easier and safer for beginners to use, we recommend proceeding as outlined in the checklist below:

Work phase	Questions	Note
Planning	How many I/O's are required in total ?	This determines whether one or more AS-Interface systems will be needed for realization.
Planning	How great is the system power requirement ?	Important for the selection of suitable system power supply units. Never switch AS-Interface power supply units in parallel !
Planning	How large is the total scope of the system ?	Repeaters must be used if the sum of all cable lengths exceeds 100 m.
Configuration	How are the modules to be assigned ?	To avoid addressing errors, create an assignment scheme and carefully label all addressed modules accordingly !
Installation	Where will the modules be installed ?	Depends on the module enclosure type : either in a switch cabinet or terminal box. Place modules of enclosure type IP 67 close to sensors and actuators for the sake of greater efficiency.
Setup	How will the system configuration be executed ?	In configuration mode (master operating mode) the detected slave profiles are automatically read in by the master.
Setup	Have all slaves been detected by the master ?	When all slaves have been detected, the master should be switched into protected operating mode. This enables exhaustive diagnostics.
Setup	How can a simple I/O function test be performed ?	Quick and straightforward with special, easy to use setup tools ¹ or via the gateway with graphics display. Alternatively with the PLC Software Tool.

¹ e.g. : ASI Control Tools Article No 55717

2.4 Electrical specification

2.4.1 System cables

To meet individual application requirements, system wiring on the field bus side can be realized either with round cables² or also with the yellow ribbon cable³ characteristic for AS-Interface systems.

Cables are basically of the 2-wire type without PE cable. Cable screening is not necessary thanks to the transmission technology.



Two electrical aspects are decisive in the selection of a suitable transmission cable :

- a) **DC resistance** (line cross-section)
for reasons of auxiliary power transfer
- b) **Transmission characteristics**
Impedance from 80 to 120 ohms for 167 kHz

Additional auxiliary power is usually required for actuators.



Cable leads

- | | | |
|-------|---|---|
| brown | - | Field bus system cable (ASI+)
24V DC auxiliary power (+24V DC) |
| blue | - | Field bus system cable (ASI-)
24V DC auxiliary power DC (0V) |

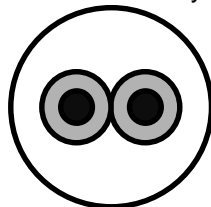


Fig. 2-4 : AS-Interface round cable according to DIN VDE 0281 Part 402

For standard profiled cables, the strand insulation is made of a rubber compound. For more critical applications, particularly as regards chemical stability, TPE or PUR cables are available.

The main area of application is the stationary wiring of machines and installations in a rough environment.

For the transmission cable, you can also use a common 2-wire round cable without PE cable, particularly for chained applications or wiring in switch cabinets.

² Art. No 55 747

³ Art. No. 55 743

2.4.2 System power supply



Fig. 2-5 : AS-Interface system power supply⁴

AS-Interface systems require a 29,5V to 31,6V DC power supply conforming to IEC directives (PELV : Protected Extra Low Voltage).



Each AS-Interface branch requires its own power supply.

The data filter integrated into the power supply constitutes the basic difference in comparison with usual industrial power supplies. It enables the transmission of both power and data.

⁴ Art.-No. 85381 MCS-A 4 110-240/30
Art.-No. 85382 MCS-A 4 110-240/30 EFD (with earth fault detection)

2.4.3 Voltage drop

System-related limit values regarding system power supply must be strictly observed if maximum functional safety and fault-free operation are to be ensured.



Always ensure that the system voltage, measured at the slave furthest away from the system power supply, does not drop below 26,5V DC.

A voltage drop, dependent on the load current, results in the system cable as the sensors and actuators are supplied centrally from the AS-Interface power supply unit.



In critical cases, optimisation can be achieved by changing the location of the system power supply unit within the system layout and by using power supply cables of a greater conductor cross-section (only for round cables).

AS-Interface modules with digital inputs support the direct connection of commercially available sensors. The voltage needed to operate the sensors is supplied by a slave internal power supply taken from the bus.

With the lowest admissible supply voltage at slave level and with regard to voltage drops in the slave, optimal power supply of sensors is always guaranteed.



The sensor power supplies of different AS-Interface modules supplied by the bus cable are not grounded and should in no case be coupled !

2.4.4 Cable cross-sections

The chief determining factor in selecting a suitable transmission cable in regard to energy transfer is the DC resistance.

Initial conditions :

- the cable length is 100 m
- 31 slaves are connected to the cable at regular intervals, and
- the current consumption of 65 mA is the same for all slaves (total current : 2 A).

The table below shows the resulting drop of voltage between the power supply inputs and the connecting point of the last slave:

Cable cross-section in mm ²	0,75	1,5	2,5
DC resistance in mOhm/m	52,0	26,6	16,0
Max. voltage drop in en V	5,4	2,7	1,6

Table 2.4-1 : Influence of various cross-sections

2.4.5 Auxiliary power supply

The power supply required for actuators is provided by an auxiliary power supply. Information relating to voltage drops and cable cross-sections also apply to auxiliary power supply, all the more since currents are higher.



In case of a short-circuit on the output of a slave far away from the system power supply, some slaves may sporadically indicate an undervoltage of the auxiliary power supply, due to a voltage drop caused by the high current in the cable.

2.5 Slave profile

Each slave is marked with a specific profile to assure unequivocal identification by the AS-Interface master. The conditions for this are listed in the AS-Interface specifications. The profile consists of one identification code (ID-Code), 2 extended identification codes (ID1-Code and ID2-Code) as well as the Inputs/Outputs configuration code (IO-Code). These data determine the slave function.

The slave profile is represented as follows : S-IO.ID.ID2 (e.g. : S-7.A.0). This profile is permanently programmed by the manufacturer and cannot be changed. The ID1-Code can be modified by the user with the command « Write_Extended_ID-Code_1 ». By default the ID1-Code is 'F' for a standard slave or '7' for an AB slave (ID=A).

The slave profile information (ID-, ID1-, ID2- and IO-Code) is very important for an easy replacement of slaves in the system. It enables the master to check if the current configuration corresponds to the reference configuration.

3 Installation information

3.1 Dimensions

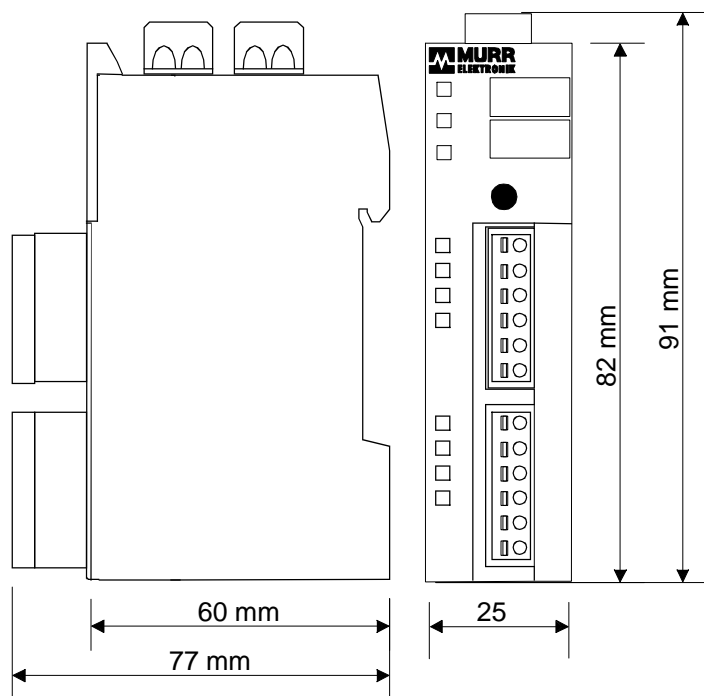


Fig. 3-1 : Dimensions MASI20

3.2 Mounting

Modules can easily be mounted on a rail. When attaching the module, it must be assured that the snap-in mechanism is tight fit.

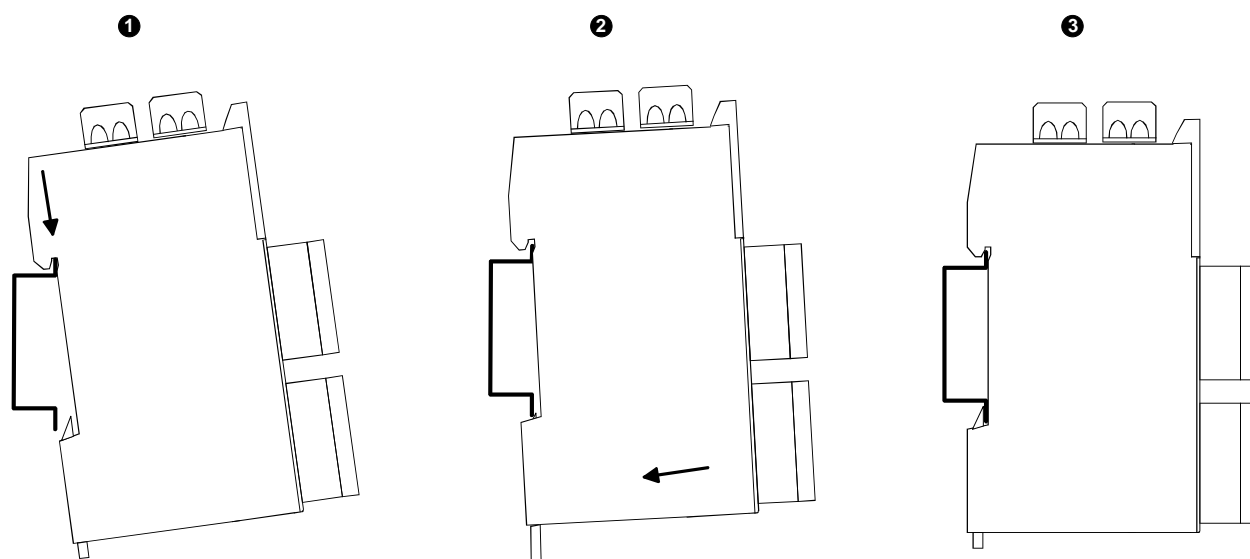


Fig. 3-2 : DIN-rail mounting

3.3 Unmounting

Use a screwdriver to unmount modules from rail.

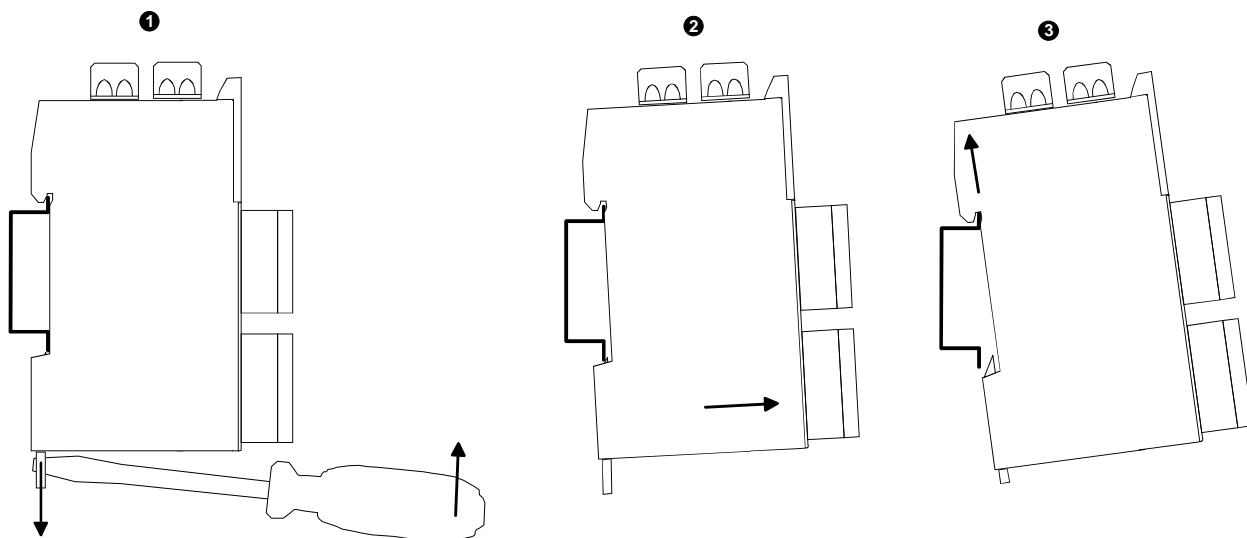
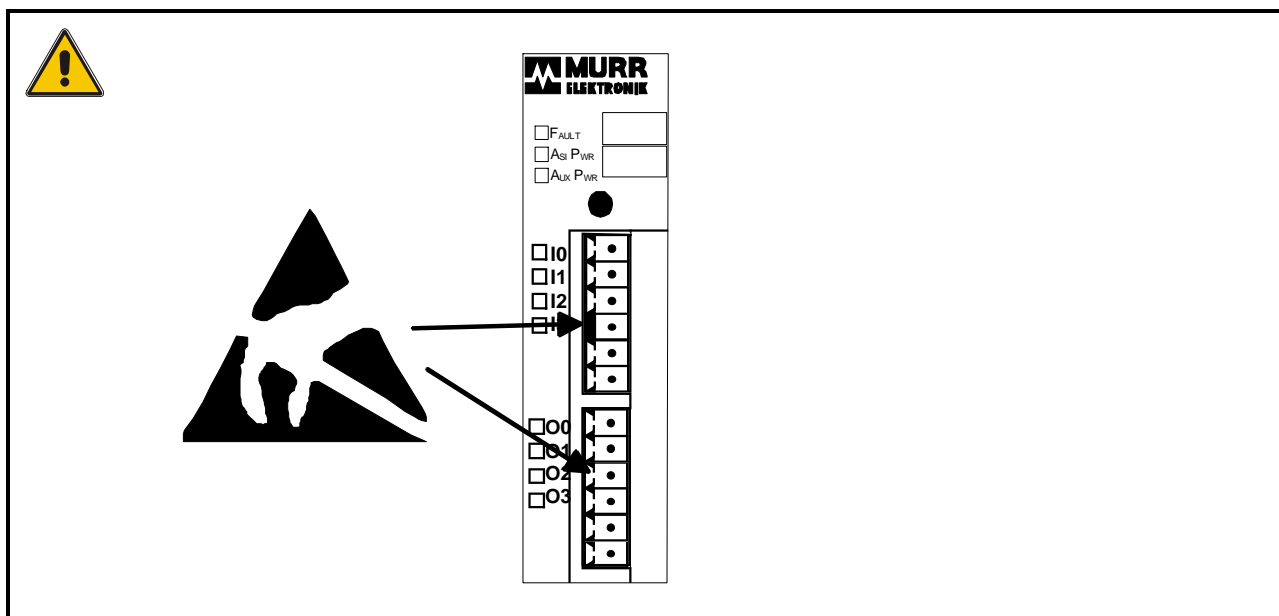


Fig. 3-3 : DIN-rail unmounting



3.4 Wiring (bus and supply cables)

3.4.1 Field bus

AS-Interface field bus wiring is effected using a 2-wire cable conforming to AS-Interface⁵ specifications.



Wires
brown
blue

Field bus system cable (ASI+)
Field bus system cable (ASI-)

Bus connection is performed using 2 wires.
Two types of connectors can be used to connect the module.

3.4.2 Power supply

An additional power supply source may become necessary as soon as the energy delivered by the slave from the bus is not sufficient for the current consumption of the AS-Interface slave and the corresponding peripheral components such as sensors and/or actuators.

Typical applications requiring an additional power supply :

- Photoelectric safety locking,
- Inductive loads (switching devices, valves ..).
- etc...



The additional power supply unit must be fitted with a protection cutoff device and must be in conformity with PELV directives according to IEC 364-4-41.

Wiring in switch cabinets is effected with single wires. It is also possible to use an adapted round cable or the specific profiled flat cable.



Wires
brown
blue

Auxiliary supply 24V DC (+24V DC)
Auxiliary supply 24V DC (0V)

Bus connection is performed using 2 wires.
Two types of connectors can be used to connect the module.

⁵ see Chapter 2.4.1 : System cables

3.4.3 Wiring system

3.4.3.1 Stripping connectors

To connect a terminal for module MASI20 it is initially necessary to lead the wire in the terminal then to fix the cap of the terminal by strongly supporting until locking of the cap (pins on the side) so that the claws make a good contact with the heart of the wire. This terminal makes it possible to ensure the continuity of the bus even if module MASI20 is disconnected.

The connection of the cables is identical for both connection.

! The acceptable section of wire goes from 0,5 to 0,75mm².

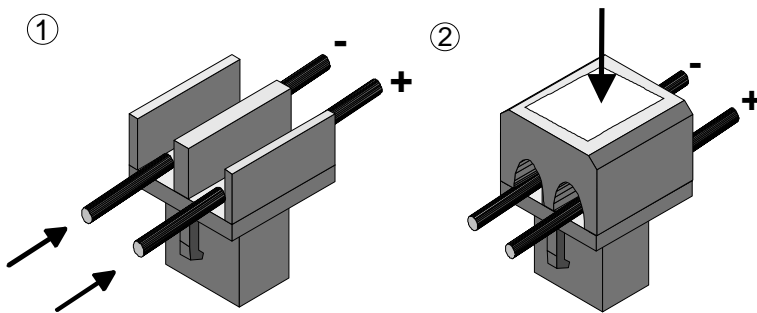


Fig 3-4 : wiring stripping connectors

3.4.3.2 Screw connectors

AS accessory⁶ we provide screw connectors. Those one accept a bigger wire section but don't ensure the continuity of the bus even if module MASI20 is disconnected.

The connection of the cables is identical for both connection.

! The acceptable section of wire goes from 0,5 to 1,5mm².

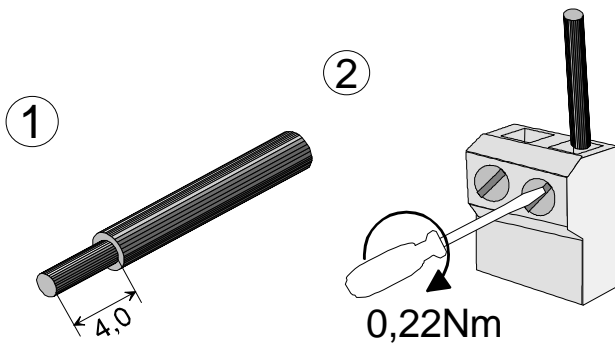


Fig 3-5 : wiring screw connectors

⁶ AS-i (yellow) Ref. 55 211
Power (black) Ref. 55 212

3.5 Sensor and transmitter connection

According to the module type, the power supply of connected sensors or transmitters is provided by the AS-Interface system power supply unit or by auxiliary supplies.

Supply of sensors / transmitters	MASI20
from the system	Art. No. : 55685 Art. No. : 55688 Art. No. : 55768
from auxiliary supply	Art. No. : 55686 Art. No. : 55687

Table 3.5–1: List of modules

The 24V DC power supply of sensors is furnished by the AS-Interface system power supply unit and is electronically protected against overload and short-circuit. All sensors and transmitters connected to a Murrelektronik AS-Interface module are supplied by the same power source.



The power supply of sensors from the system's supply unit is not grounded. Never connect the sensor supply or sensors/transmitters to other modules.

3.5.1 Spring connector

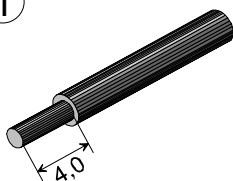
The product is delivered with spring connectors. To connect a wire it is first of all necessary to strip it on 4mm then using a screwdriver to press on the strip to give off the blade. To then insert the son in the terminal and to slacken the pressure on the strip so that the blade imprisons the son and makes contact.

The connection of the cables is identical for the detectors and actuators.



The acceptable section of wire goes from 0,14 to 1,5mm².

①



Ø 0,14 - 1,5mm²

②

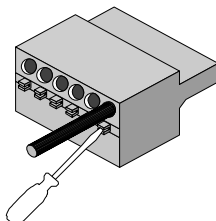


Fig 3-6 : wiring spring connectors

3.5.2 Screw connectors

As accessory⁷ we also provide screw connectors.

The connection of the cables is identical for the detectors and actuators.



The acceptable section of wire goes from 0,14 to 1,5mm².

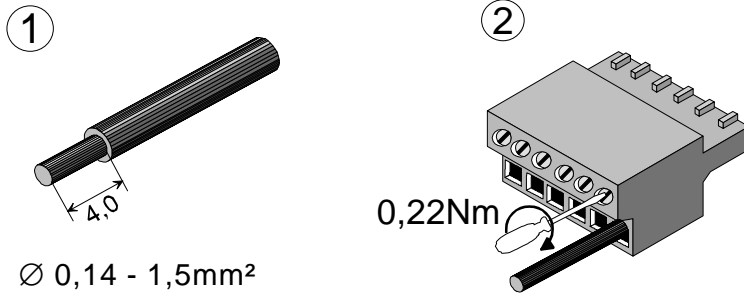


Fig 3-7 : wiring screw connectors

3.5.3 Protection inversion of connector

In order to avoid reversing the assembly of the connector on the module there exists a pin on the site of the input connector. This prevents from connecting the output connector instead the input connector. To be able to connect the input connector it is necessary beforehand to cut a pin of codification as explained on the figure below.

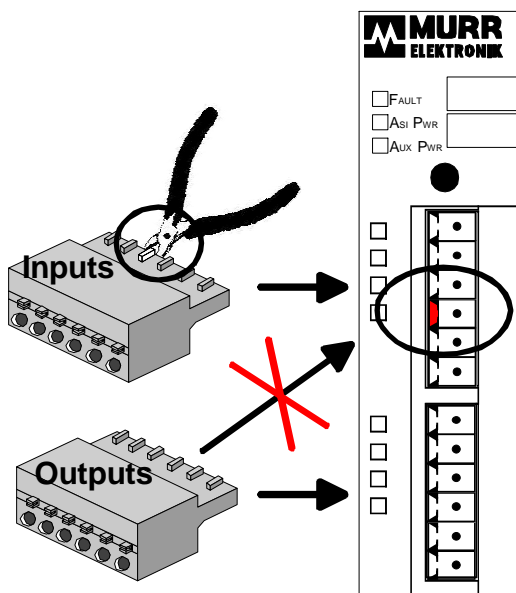


Fig 3-8 : Protection inversion of connector

⁷ Ref. 55 210

3.5.4 Connecting 2-wires sensor

The 2-wires sensor must be connected in the following way:

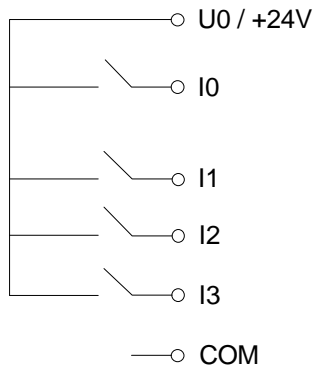


Fig 3-9 : 2-wires sensor connection



Refer to the wiring plan printed on the side of the product.

Defer to the plan of wiring being reproduced on marking on the side of the product

3.5.5 Connecting 3-wires sensor (PNP)

The 3-wires PNP sensor must be connected in the following way:

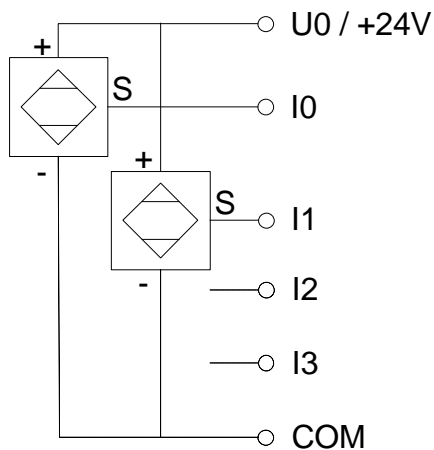


Fig 3-10 : 3-wires sensor PNP connection



Refer to the wiring plan printed on the side of the product.

3.6 Actuator connection (loads)

The loads connected to the MASI20 module are supplied by auxiliary power supply.
For MASI20 modules the output voltage is electronically protected against short-circuit and overload.
The max. admissible load on outputs goes from 0,5A for transistor outputs to 2A for relays outputs.

Type of output	MA SI20
Relays	N° art. : 55685 N° art. : 55768
Static with transistor	N° art. : 55686 N° art. : 55687

Table 3.6–1: List of modules

The capacity of outputs is indicated in the installation manual of each module.



The module outputs of the MASI20 range and the corresponding potentials must in no case be galvanic-connected to the inputs or outputs of other AS-Interface modules.

3.6.1 Protection inversion of connector

In order to avoid reversing the assembly of the connector on the module there exists a pin on the site of the input connector. This prevents from connecting the output connector instead the input connector. To be able to connect the input connector it is necessary beforehand to cut a pin of codification as explained on the figure below.

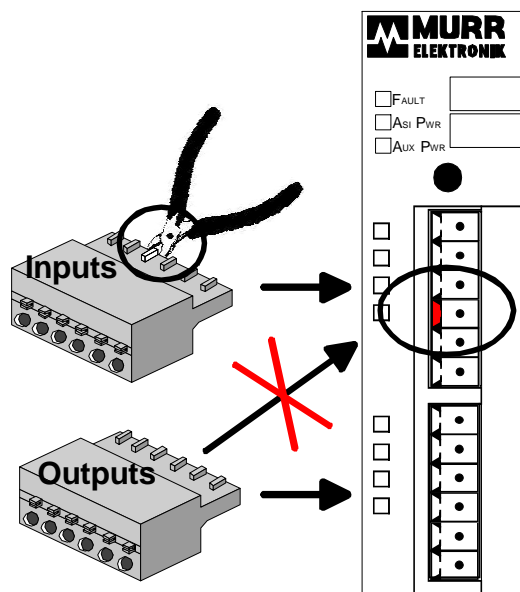


Fig 3-11 : Protection inversion of connector

3.6.2 Wiring a load on a static transistor output

Some modules of the MASI20 family have static outputs (transistor) and loads must be connected in the following way :

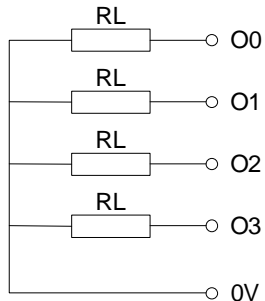


Fig 3-12 : wiring a static transistor output



Refer to the wiring plan printed on the side of the product.



By commuting big capacitive load it is possible that the module indicate a periphery fault due to the switching down delay.

3.6.3 Wiring a load on a relays output

Some modules of the MASI20 family have relays outputs and loads must be connected in the following way :

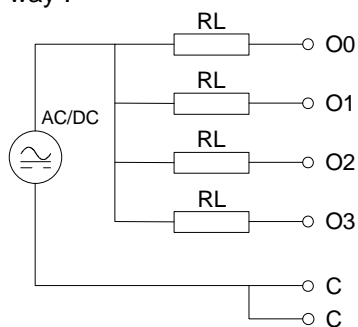


Fig 3-13 : Wiring a relays output



Refer to the wiring plan printed on the side of the product.

4 System configuration

4.1 Addressing

Each slave must be programmed with a unique address before setting up the AS-Interface system. To do so, you can use an addressing device⁸ or perform this configuration online via the master. Refer to the corresponding description.



Addresses are non-volatile : they remain stored in the slave thanks to an EEPROM even in case of power cutoff. Addressing is not limited.

According to the standard specifications, addresses can be assigned from 1 to 31.
For systems conforming to the extended specifications (up to 62 slaves) the available address range is from 1A to 31A and 1B to 31B.



The installation of an appropriate master is required when using AS-Interface systems conforming to the extended specifications !

**In a system you can generally operate simultaneously slaves conforming to standard specifications and slaves conforming to the specifications.
In this case, standard slaves are identified as slaves of type 'A' by the master.
The same address that is not used in group 'B' is no more available.**

New slaves that are not yet addressed are always allocated to the address 0. Although they have been recognized by the master, they are not included into the communication process.
When replacing a slave while the system is operating (maintenance, repair, etc.) it is automatically allocated to the address 0 by the master (→ Chapter 4.3 Automatic configuration).

⁸ Addressing device Art. No 55696

4.1.1 Addressing device connection

Modules are fitted with a specific plug for addressing devices. When inserting the addressing link, the module is automatically cut from the field bus for as long as it is connected to the addressing device. This way addressing is possible even after the system set-up and the connection of the field bus cable to the AS-Interface.

To be able to address a MASI20 module, simply connect the addressing device to the addressing plug of the module. Module addressing with a manual addressing device requires no auxiliary supply.

Refer to the device instructions to address the slaves.

Slaves are provided with the default address 0.

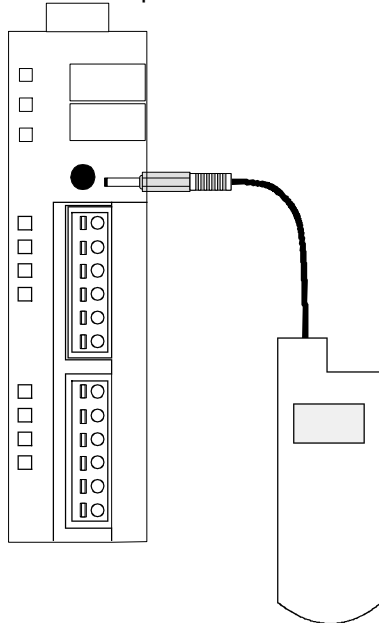


Fig. 4-1 : Interface for MASI20

4.2 System configuration

The system setup is established during the configuration phase ; the master must be used in configuration mode. In this mode, the master automatically recognizes the slaves connected to the bus. The features of the system, the profiles (ID-, ID1-, ID2-, IO-Code) as well as the slave addresses are stored by the master.



In case of system extensions that are not in conformity with the AS-Interface specifications, it is possible that some slaves are not detected by the master.

As soon as the whole system is configured and the master is operating in "Protected mode" the differences in relation to the configured system can be automatically detected by the master (e.g. slave failures, damaged bus cable or system extensions).

System configuration can be performed by an addressing device or directly via the master. The configuration procedures are different according to the selected mode.

4.2.1 Configuration with an AS-Interface addressing device

- ① Address the slaves with the addressing device.
(For slaves with an addressing plug, this operation can be performed after step ②).
- ② Install the slaves and connect them to the system cable.
- ③ Switch the master into configuration mode (↵ Master user's manual).
- ④ Check if all the slaves have been detected and stored into the LDS list (List of Detected Slaves),
(↵ Master user's manual).
- ⑤ Configure the system (↵ Master user's manual).
- ⑥ Switch into protected configuration mode (↵ Master user's manual).
- ⑦ Check the master displays. The display of configuration errors must not be enabled
(↵ Master user's manual).

4.2.2 Configuration via the AS-Interface master

- ① Switch the master into configuration mode (↵ Master user's manual).
- ② Connect the slave to the AS-Interface system cable.
- ③ Change the slave address via the master (↵ Master user's manual).
- ④ Repeat steps ② and ③ until all the slaves are connected and addressed.
- ⑤ Check if all the slaves have been detected and stored into the LDS list (List of Detected Slaves),
(↵ Master user's manual).
- ⑥ Configure the system (↵ Master user's manual).
- ⑦ Switch into protected configuration mode (↵ Master user's manual).
Check the master displays. The display of configuration errors must not be enabled.
(↵ Master user's manual).

4.3 Automatic configuration

In case of a slave failure while the system is operating, it can be easily replaced by a new slave if the following conditions are complied with :

- ① the master must be in protected operating mode and the automatic configuration must be active,
- ② failure of only one slave,
- ③ the new slave is assigned to address 0,
- ④ the profile of the new slave is identical to the profile (stored by the master) of the slave to be replaced.

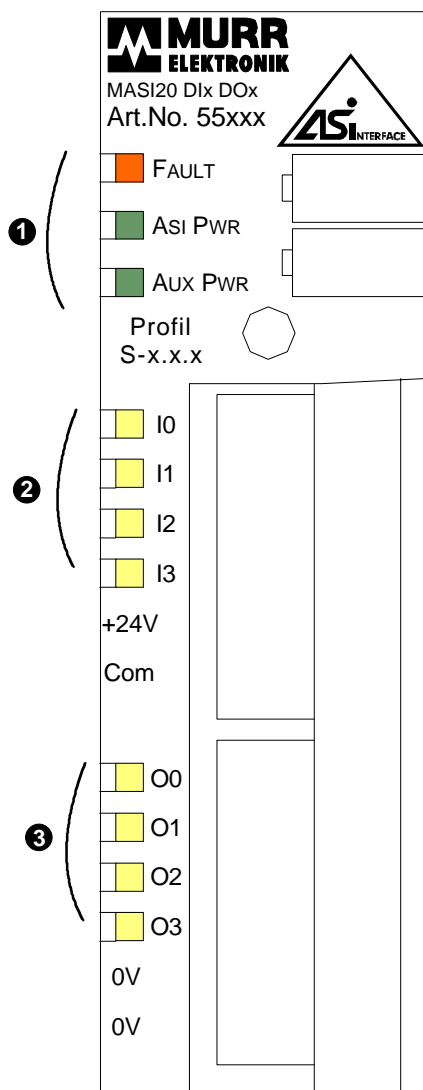
Only under these conditions the new slave is integrated into the system and automatically configured by the master, which immediately assigns the address of the faulty slave.

5 Diagnostic information displays

Diagnostic information is an important prerequisite for easy setup.

Errors can be quickly identified and rectified through clear information regarding the field bus system, the I/O module and connected peripheral components such as sensors and actuators.

All MASI20 modules feature separate, clearly arranged displays for bus status, device status and I/O status. These displays are located on the front of the module housing.



- ❶: LED Diagnosis / Voltage
- ❷: LED input status display
- ❸: LED output status display

Fig. 5-1 : Diagnosis displays MASI20

5.1 Bus / Device status display

The LED's on the front of the module are marked 'ASI PWR' and 'FAULT' for clear information and represent a static or flashing LED display.

ASI PWR (green)	FAULT (red)	Status
○	○	absence of AS-I operating voltage
*	*	no data communication
*	○	module OK
*	⊗	peripheral error : - short-circuit at sensor supply - extern supply under voltage - short-circuit at transistor output

○ off ⊗ flashing * on

Table 5.1–1: Bus / Device status display

5.2 I/O status display

A status display is allocated individually to each input and output. According to the function the display is as follows : 'I1...In' for inputs or 'O1...On' for outputs. The display is located directly next to the corresponding connector and makes it possible to recognize the status of peripheral components such as sensors and actuators.

I / O (yellow)	Status
○	input / output deactivated
*	input / output activated

○: off *: on

Table 5.2–1 : I/O status display

5.3 Auxiliary supply

The power supply of the modules with an auxiliary supply are fitted with a green LED. The auxiliary supply must be galvanic-separated according to IEC 364-4-1 (PELV).

Aux PWR (green)	Status
○	No auxiliary supply
*	Auxiliary supply

○: off *: on

Table 5.3–1 : Auxiliary supply display

6 Overload / short-circuit response

6.1 Sensor / transmitter supply

A short-circuit or an overload on the sensor supply corresponds to a peripheral error (FID) of the slave ; error indicated by the master if it is in conformity with the specification AS-i 2.1.

- The slave indicates such errors by flashing display of the red LED „FAULT“. The slave still works normally.
- The error causes a current limitation and a voltage drop : sensors are no more supplied.
- The master indicates the peripheral error by flashing display of the „CONFIG ERR“ LED.

When the cause of the error has been corrected.

- The slave is reset (the red LED „FAULT“ is off)
- The sensor supply is restored.
- The error is no more indicated by the master.

6.2 Auxiliary supply

Absence of voltage or a voltage below 9V of the auxiliary supply corresponds to a peripheral error (FID) of the slave ; error indicated by the master if it is in conformity with the specification AS-i 2.1.

- The slave indicates such errors by flashing display of the red LED „FAULT“. The slave still works normally.
- The outputs or the sensor supply are no more supplied (or with low voltage >9V).
- The master indicates the peripheral error by flashing display of the „CONFIG ERR“ LED.

When the cause of the error has been corrected.

- The slave is reset (the red LED „FAULT“ is off).
- The output or sensor supply is restored.
- The error is no more indicated by the master.



In case of a short-circuit on the output of a slave far away from the system power supply, some slaves may sporadically indicate an undervoltage of the auxiliary power supply, due to a voltage drop caused by the high current in the cable.

6.3 Outputs

A short-circuit or an overload on the outputs corresponds to a peripheral error (FID) of the slave ; error indicated by the master if it is in conformity with the specification AS-i 2.1.

- The slave indicates such errors by flashing display of the red LED „FAULT“. The slave still works normally.
- The short-cut output is disconnected by the output driver.
- The master indicates the peripheral error by flashing display of the „CONFIG ERR“ LED.

When the cause of the error has been corrected.

- The slave is reset (the red LED „FAULT“ is off).
- The output is reset (initial status on the AS-i bus).
- The error is no more indicated by the master.



By commuting big capacitive load it is possible that the module indicate a periphery fault due to the switching down delay.